Prosodic parameters of French : a cross-language approach

フランス語の韻律パラメーター：対照言語的アプローチ

Daniel HIRST, Albert Di CRISTO
et Yukihiro NISHINUMA

ダニエル・ハースト，アルベール・ディクリスト，西沼行博

キーワード：
(韻律パラメーター)
(フランス語)
(対照言語学)

フランス語の韻律パラメーター：対照言語的アプローチ

ダニエル・ハースト，アルベール・ディクリスト，西沼行博

要旨

エクサンプロヴァンス大学音声研究所では，かなり前からフランス語のプロソディーを，マルチ・パラメーター的枠組みの中で研究している。欧印言語に適用されているこの方法を，近い将来フランス語と日本語の組織的な比較研究にも用いようと考えている。

フランス語には語に特有なストレスも声調もないが，強調アクセントのパターンは，普通言われている以上に複雑である。語（レキシカル・ワード，時には機能語も含む）の第１音節と最終音節に強勢を付与したり，ある条件付きでそれを中和したりする，極めて少数のプロミネンス指定規則で，観察しうる種々のアクセント・パターンを説明できることがわかった。

このようなアクセント・パターンは，音韻的に言って，トーン・ユニットのヘッドが右端に来るか左端に来るかという言語特有のパラメーターを基礎とする階層的な韻律組織として記述される。次のステップで，英語とフランス語の場合では，言語特有のテンプレートを用いてイントネーション・パターンを表現する。この非線形表現は，言語，方言，スタイル，構文などで異なるダウンステップ制御規則とともに，いろいろな制約を線形化することを前提としている。

1. Background

The **non-segmental** or **prosodic** characteristics of natural speech, essentially **rhythm** and **intonation**, are paradoxically among the most universal and at the same time the most language-specific features of human language. All languages possess rhythm and intonation and many characteristics of such systems seem to be language independent yet at the same time it has been shown experimentally, for example, that speakers are capable of identifying the language of an utterance on the basis of its prosody alone.

The approach to the study of prosody adopted at the Institut de Phonétique d'Aix seeks to account for the ways in which prosodic characteristics of utterances vary systematically across languages as well as the ways in which such characteristics fulfill different communicative functions in different languages. The most useful formulation of such an account would be in the form of a set of abstract **parameters**, each of which can assume different values (binary, scalar or gradient) for different languages, and which can combine in various ways to determine the observed variability between the prosodic systems of different languages (Hirst & Di Cristo 1998). Although the rationale behind such a parametric approach derives from the programme of recent work in generative grammar (Chomsky 1981) and generative phonology (Halle & Vergnaud 1987), our aim is to develop a framework for such an account which is independent as far as possible of the theoretical assumptions of those carrying out the research and at the same time as independent as possible of any one particular language. In order to achieve such a high degree of objectivity, we centre our activities on the formulation of empirical procedures designed in such a way as to make a minimum of theoretical assumptions.

This cross-language research programme has so far been applied to the study of four languages: English, French, Spanish and Arabic

(Hirst et al. 1993). Within the framework of the European sponsored MULTEXT project (Ide & Véronis 1994) a pilot study will also be applying the same methodology to six European languages: English, French, Spanish, Italian, German and Dutch. This paper provides us with the opportunity of looking at the possibility of applying this methodology to a comparison between the prosody of French and Japanese. In this article we shall be concentrating on some basic facts on the prosody of French. When possible we shall compare these results to what we know about the prosody of Japanese although it must be kept in mind that most of the experimental results referred to here have been obtained by different researchers using different methodological and theoretical approaches. Our long term aim will be to supplement this with direct comparisons between experimental results obtained within our cross-language framework.

2. Lexical prosodic parameters

A preliminary distinction can be made between the lexical and non-lexical prosodic characteristics of a language. Lexical parameters include distinctions of stress or accent, tone and length. French is quite exceptional in having no lexical prosodic characteristics at all. Unlike languages such as English and German, there are no words distinguished by the place of stress in French. Unlike languages such as Finnish and Japanese, modern French has no lexical distinctions based on the length of individual phonemes. Finally, unlike languages such as Chinese, Yoruba and (to a lesser extent) Japanese, French has no lexical distinctions based on tone.

3. French accentual patterns

Although French has no lexical stress, certain words in an utterance are given more prominence than others. This prominence is

achieved by pronouncing one syllable of the word with some combination of rising pitch, increased intensity and greater duration. Unlike Japanese, where prominence-bearing words are lexically specified, in French (as in most Indo-European languages), it is essentially the syntactic category of the word which determines whether or not it will be given prominence. The basic principle is that “lexical” or “open-class” words are accentable, while most “function” or “closed-class” words are not.

French is traditionally described as having systematic word-final accentuation (Halle & Vergnaud 1987). Recent studies have shown, however, that the actual accentuation of utterances in spoken French is considerably more complex than this (Hirst & Di Cristo 1984, Pasdeloup 1990, Di Cristo 1998). In particular, pitch prominence is often given to the initial syllable of a word as well as, or instead of, to the final syllable. This initial prominence, which in the past has often been taken for some type of emphatic stress, in fact occurs quite systematically in the speech of many speakers of modern French without conferring any particular emphatic connotation to the word. More conservative styles of French do not give prominence to the initial syllables of words.

There have been a number of attempts to account for the “probabilistic” nature of French accentuation (Fónagy 1979). A fairly satisfactory first approximation can be obtained by the following rules which can be assumed to apply from left to right:

(i) divide the utterance into Intonation Units
(ii) assign an accent to the final syllable of the Intonation Unit
(iii) assign an accent to (the initial and) final syllable of each accentable word

where the bracketed part of rule (iii) only applies in the less conservative styles mentioned above. Rule (iii) obviously considerably overgenerates

accents. A further principle, similar to the well known “stress clash” rule (sometimes also called the “thirteen men” rule), limits the number of syllables which are actually accented by stating:

(iv) do not assign an accent to a syllable if a "nearby" syllable within the same Intonation Unit is already accented.

The term “nearby” is deliberately vague and can be defined in a number of ways, each of which will result in a different set of accent patterns. To simplify the discussion we shall assume below that “nearby” is interpreted as “adjacent” which results in a fluent and correct set of accent patterns. It should however be remembered that different speakers of French may well use different strategies so that “nearby” might for example be interpreted as “less than x syllables away” where x has some integer value.

To take a few examples:

(1) a. Elle parle. (She speaks.)
b. Elle parlait. (She was speaking.)
c. Elle parlait français. (She was speaking French.)
d. Elle savait très bien parler le français.
(She could speak French very well.)
e. Elle ne savait pas très bien parler le français.
(She couldn't speak French very well.)

The words “pas” “très” and “bien” are all accentable in French despite the fact that they are function words. The rules given above generate the following patterns:

(2) a. Elle 'parle.
b. Elle par'lait.
c. Elle 'parlait fran'çais.
d. Elle 'savait 'très bien 'parler le fran'çais.
e. Elle ne 'savait 'pas très 'bien par'ler le fran'çais.

The fact that rule (ii) is ordered before rule (iii) ensures that the final syllable of each Intonation Unit will retain its accent. There is in fact independent evidence that the accent assigned to the final syllable of an Intonation Unit does not follow the same rules as the word-initial and word-final accent found elsewhere. Clitic syllables like “le”, “en”, “vous” are normally unaccentable as can be seen in (3a, 3b):

(3) a. Je le tra'duis. (I translate it.)
b. Vous vous en a'llez. (You are going away.)

When these syllables occur in final position, however, they are assigned prominence as in (4 a-c).

(4) a. 'Traduis-'le! (Translate it!)
b. 'Allez-vous 'en! (Go away!)
c. 'Où allez-'vous? (Where are you going?)

4. Prosodic structure in English and French

Work on prosodic structure theory has suggested that a fruitful way of thinking of prominent syllables is as the head of a prosodic constituent (Selkirk 1984, 1986, Halle & Vergnaud 1987). Such a representation allows, in addition to the distinction accented/unaccented, for different positions of the constituent boundary, depending on whether

the head is taken to be at the beginning or the end of the prosodic constituent.

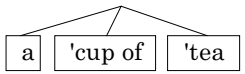
A number of factors, including the behaviour of phrase final clitics mentioned above, are consistent with the idea that accent-groups in French are “right-headed” – that is, they culminate in an accented syllable rather than starting with one as in English and presumably many other Germanic languages (Wenk & Wioland 1982, Fant et al. 1991).

Preliminary studies of durational effects suggest at least the possibility that the left/right headedness of accent groups is a parameter which distinguishes Germanic languages from Romance languages in general (Hirst et al. 1993, Hirst & Di Cristo 1998). Assuming that this is an appropriate distinction between English and French at least would mean that phrases like:

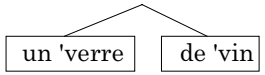
(5) a. a cup of tea
b. un verre de vin

which presumably have the same syntactic structure in English and French, would be structured differently at the prosodic level:

(6) a.



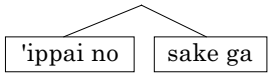
b.



In this respect Japanese is probably closer to English than to French since an accent phrase in Japanese is said to consist minimally of

a lexical word and any and all function words to its right (McCawley 1968, Pierrehumbert & Beckman 1988, Selkirk & Tateishi 1988) as in the following example:

(6) c.



5. Intonation patterns in English and French

We have accounted for unemphatic intonation patterns in English and French (Hirst & Di Cristo 1984, Hirst 1988) by assuming that High and Low tones are attached directly to the accent group (which for this reason we have preferred to call the Tonal Unit) as well as to the higher order Intonation Unit in accordance with a tonal template with the following form:

(7) a. French : Tonal Unit H L Intonation Unit L {H, L}

b. English : Tonal Unit H L Intonation Unit L {H, L}

This results in a non-linear prosodic structure which is submitted to linearisation constraints, projecting the tonal segments onto a single tonal tier.

A rule of downstepping also applies under slightly different conditions in English and French. This rule, which can be roughly formulated as follows:

(8) Downstep Rule :

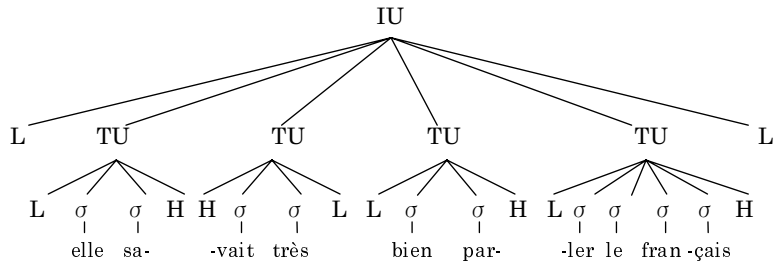
H L H
⇓ ⇓
ϕ D

converts a sequence HLH into a sequence H D (where D represents a downstepped (lowered) high tone. The rule appears to be style/dialect dependent in English: systematic downstepping is said to be more frequent in Standard British English (RP) than in either Scottish English or American English (Hirst 1998). In French, the downstepping rule seems to depend on the syntactic mode of the sentence, applying systematically in both yes/no-questions and wh-questions but only to the final Tonal Unit in assertions (Di Cristo & Hirst 1993).

The choice of the final tone in the Intonation Unit seems to depend on pragmatic and semantic constraints in both English and French (and presumably also in Japanese). In English and French a high final tone (final rise) is found both in continuatives and in questions and is generally held to be more common in yes/no-questions than in wh-questions in both languages. This again is slightly different to Japanese where both types of question seem to be commonly pronounced with a final rising pitch, with or without a sentence final particle (Abe 1972, 1998).

Applied to sentence (1d) above, assuming the stress-pattern assigned in (2d), and assuming that a terminal falling pitch is chosen, templates (7a) will generate the following prosodic structure (where the symbol σ stands for “syllable”) :

(8)

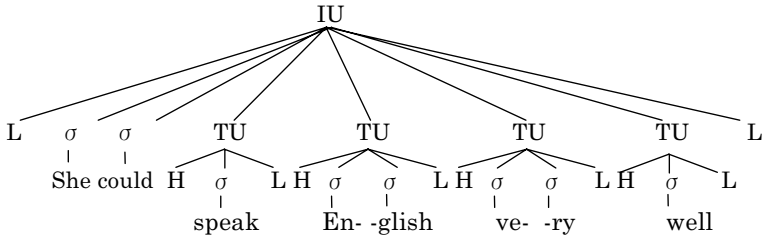


whereas the English equivalent :

(9) She could 'speak 'English 'very 'well.

would be assigned the structure :

(10)



After application of the downstep rule this non-linear structure will be converted to the bi-linear sequences:

(11) a. [elle sa- -vait très bien par- ler le français]
L H L H L H D L

b. [she could speak English very well]
L H D D D L

We have argued elsewhere (Hirst 1994, Hirst and Di Cristo 1998) that representations such as these can subsequently be converted into surface phonological then into phonetic representations which in turn can be used to generate synthetic fundamental frequency curves. Such an explicit model of intonation specifying different levels of representation is in our view an extremely interesting tool for comparing the prosodic systems of different languages. It remains to be seen how far the description of Japanese intonation, both based on existing descriptions and on our own future research, can be accommodated within such a model.

References

Abe, I. (1972) “Intonational patterns of English and Japanese.” Bolinger (ed.) *Intonation*. pp.337-347. Harmondsworth: Penguin.

Abe, I. (1998) “Intonation in Japanese.” Hirst & Di Cristo (eds.) pp.360-375.

Chomsky, N. (1981) *Lectures on Government and Binding.* Dordrecht: Foris.

Di Cristo, A. (1998) “Intonation in French.” Hirst & Di Cristo (eds.) pp.195-218.

Di Cristo, A. & D.J. Hirst (1993) “Prosodic regularities in the surface structure of French questions.” *Proceedings of the ESCA Workshop on Prosody.* pp.268-271. Lund.

Fant, G., A. Kruckenberg & L. Nord (1991) “Durational correlates of stress in Swedish, French and English.” *Journal of Phonetics* 19. pp.351-363.

Fónagy, I. (1979) “L'accent français: accent probabilitaire.” Fónagy & Léon (eds.) *L'Accent en Français Contemporain*. Studia Phonetica 15. pp.123-233. Toronto: Didier.

Halle, M & J.-R. Vergnaud (1987) *An Essay on Stress.* Cambridge, Mass.: MIT Press.

Hirst, D.J. (1988) "Tonal units as constituents of prosodic structure: the evidence from English and French Intonation." Van der Hulst & Smith (eds.) *Autosegmental Studies in Pitch Accent*. pp.151-165. Dordrecht: Foris.

Hirst, D.J. (1994) "Analysis of fundamental frequency patterns for multi-lingual synthesis using INTSINT." *Proceedings of 2nd ESCA/IEEE Workshop on Speech Synthesis* (New York, September 1994).

Hirst, D.J. (1998) "Intonation in British English." Hirst & Di Cristo (eds.)

Hirst, D.J. & A. Di Cristo (1984) "French intonation: a parametric approach." *Die Neueren Sprachen*. 83 (5). pp.554-569.

Hirst, D.J. & A. Di Cristo (eds.) (1998) *Intonation Systems : a Survey of Twenty Languages*. Cambridge: Cambridge University Press.

Hirst, D.J., A. Di Cristo, M. Le Besnerais, Z. Najim, P. Nicolas & P. Roméas (1993) "Multi-lingual modelling of intonation patterns." *Proceedings of the ESCA Workshop on Prosody.* pp.204-207. Lund.

Ide, N. & J. Véronis (1994) "MULTEXT : Multilingual Text Tools and Corpora" *Proceedings of COLING '94* (Kyoto).

McCawley, J. (1968) *The Phonological Component of a Grammar of Japanese.* The Hague: Mouton.

Pasdeloup, V. (1990) "Modèle de règles rythmiques du français appliqué à la synthèse de la parole." Doctoral Thesis, Université de Provence.

Pierrehumbert, J. & M. Beckman (1988) *Japanese Tone Structure.* Cambridge, Mass: MIT Press.

Selkirk, E.O. (1980) "The role of prosodic categories in English word stress." *Linguistic Inquiry* 11. pp.563-605.

Selkirk, E.O. (1984) *Phonology and Syntax : the Relation between Sound and Structure*. Cambridge, Mass: MIT Press.

Selkirk, E.O. (1986) "On derived domains in sentence phonology." *Phonology Yearbook* 3. pp.371-405.

Selkirk, E.O. & K. Tateishi (1988) "Syntax and phonological phrasing in Japanese." Georgopoulos & Ishihara (eds.) *Studies in Honor of S.-Y. Kuroda.* Reidel.

Wenk, B. & F. Wioland (1982) "Is French really syllable-timed?" *Journal of Phonetics* 10. pp.193-216.